

Echinacea purpurea (L.) Moench

Echinacea Purpurea Aerial Parts

Herba Echinaceae purpureae

Asteraceae

Echinacea purpurea is one of the three primary forms of *Echinacea* used in Western herbalism to stimulate immune function. Of the species, the leaf juice of *E. purpurea* is the most widely researched. Because of the widespread cultivation of *E. purpurea*, there is a very low likelihood for adulteration of *E. purpurea* leaf.

A. Leaf

Surface view: Upper epidermis consists of polygonal cells with sinuous anticlinal walls that are pitted along the veins; anomocytic stomata are infrequent, ~35–40 μm long; cuticle striated at the leaf margins and bases of the covering trichomes; covering trichomes up to 550 μm long and ~50 μm across at base, uniseriate, with three or four thick-walled cells, the apical cell markedly longer than the proximal ones; epidermal cells at the base of the covering trichomes are arranged in a rosette; trichomes are often broken off at the base; glandular trichomes are rare, occurring adjacent to veins, up to 100 μm long, 20 μm broad, multicellular and uniseriate, with very thin-walled cells of equal size and dimension; lower epidermal cells generally are more sinuous than upper ones; abundant anomocytic stomata; often a single epidermal cell will be the subsidiary cell for two or more stomata; covering and glandular trichomes are more frequent on the lower epidermis, resembling those on the upper epidermis; secretory ducts containing yellowish-greenish oil droplets occur along veins.

Transverse section: Bifacial; epidermis with thick cuticle; palisade cells in one or two layers; spongy mesophyll is somewhat broad; small secretory ducts accompany veins.

B. Stem

Surface view: Epidermal cells axially elongated, with a finely striated cuticle.

Transverse section: Rectangular, radially elongated epidermal cells; cortex consists of angular collenchyma; collateral vascular bundles; fibers cap the phloem bundles; small xylem, with embedded fibers; pith consists primarily of pitted

cells, with secretory ducts ~30 μm diameter located near the xylem.

C. Inflorescence and Flower

Capitulum: Radiate, with both ray and disk florets; receptacle is conical to flat, with awned receptacular bracts; recurved or reflexed involucre bracts, in four series.

Phyllary: Stomata and trichomes similar to those found on the leaf.

Ray floret: Covering and glandular trichomes are abundant, similar to those found on the leaf; epidermal cells of ligule papillose; secretory ducts occur along veins; very short, thick-walled, multicellular trichomes occur at the base of the floral tube.

Disk florets: Covering and glandular trichomes are abundant, similar to those found on the leaf; tricolporate, spheroidal pollen grains, ~35–42 μm diameter, with spiny exine.

Powder: Fragments of the leaves showing bases of covering trichomes or cicatrices, glandular trichomes and secretory ducts along the veins; covering trichomes; fragments of pitted parenchyma from the stem pith; bundles of fibers, sometimes with phytomelanin coating (originating from the cypsela present in the flowers); tricolporate spheroidal pollen grains. The secretory tissues of the stem are inconspicuous in powder.

